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ABSTRACT

This paper focuses on reflection and reflective thinking as a means of developing expertise in instructional designers. The need for the reflective instructional designer is discussed, and reflective thinking is examined from several perspectives, i.e., controlled thinking, tacit knowledge, epistemic assumption, abductive reasoning, willingness to act, and social practice. A reflective thinking model made up of the following five phases is then described: problem recognition; problem clarification; hypothesis or suggestion formation and modification; mental elaboration of suggestions; and actions taken on the basis of the best supported hypothesis/suggestion. Six components explain the nature of reflective thinking: willingness to be thoughtful; willingness to recognize and understand the context in which assumptions and actions are formed; willingness to explore and imagine alternatives; understanding and accepting epistemic assumptions; using abductive inference; and exposure to a variety of interpretive considerations in dialogue with others. Three aspects of reflection identified by the preceding model--self-reconstruction; action-reconstruction; and social-reconstruction--are considered, and strategies for promoting reflective thinking in instructional designers based upon these aspects are offered. A figure illustrating the reflective thinking model is included. (Contains 26 references.) (DLS)

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Reflection as a Means of Developing Expertise in Problem Solving, Decision Making, and Complex Thinking of Designers

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Abstract

The paper attempts to reexamine the concept of reflection and reflective thinking as a means of developing expertise in instructional designers. It is argued that since the real world problems that designers face are ill-structured and ill-defined, designers must become reflective thinkers in order to define the problem, evaluate and examine relevant information and construct a plausible solution, acknowledging that the solution itself is open to further evaluation and scrutiny. In an attempt to describe conditions and strategies for promoting reflective thinking, two conceptual models are proposed and discussed.

The need for the reflective instructional designer

Most of the problems that instructional designers confront in their practice are unclear, unique and situation-based, and cannot be described with a high degree of completeness or solved with a high degree of certainty. These problems are different from well-structured problems that can be described completely and the solution can be identified as true or correct. In contrast to well-structured problems, ill-structured problems require the thinker to consider alternative arguments, seek out new evidence, or evaluate the reliability of data and sources of information (King & Kitchner, 1994). In order for designers to choose between competing ends and being able to solve the ill-structured, ambiguous and situation-based problems, they must reach to a level of thinking that is complex and reflective.

Simple logic or procedures are not adequate for solving the kind of problematic situations that are highly complex and context-based. Kitchner and Kitchner (1981) argue that in order to solve an ill-structured problem, the thinker must be reflective. A reflective thinker should hold the epistemological assumption that each solution may have some validity and may contain some errors, and that there may be no absolutely correct choice. The basic difference between this type of thinking and authority-based thinking or formal logic is that the first requires the continual evaluation of beliefs, assumptions and hypotheses against existing data and against other plausible interpretations of the data. It requires abductive thinking and reasoning. The resulting judgments are offered as reasonable integration or syntheses of opposing points of view, not a correct solution. This type of complex thinking is what Dewey also called reflective.

The importance of reflective thinking skills as a key element in designer's expertise and professional development is being recognized in the field of educational technology (e.g., Rathbun, Saito & Goodrum, 1997; Roland, 1994; Willis, 1995). New design practices and proposed design models which are based on constructivist interpretivist theory identify reflection as a major component of the processes of the decision making in design activities (Moallem & Earle, in press; Willis, 1995). Carefully articulated experiences that provide strategies for linking knowledge and action through reflection are becoming more common in the educational technology field. However, there has not been enough discussion and evidence about how to foster reflective thinking in designers. While it is obvious that using a recursive design model requires a reflective instructional designer who is able to think reflectively and reason adbuctively, more efforts are devoted to developing design models rather than to training reflective designers.

The purpose of this paper is to reexamine reflective thinking from different perspectives and upon reconceptulization of the term, propose a model for fostering reflective thinking and judgment among instructional designers. The paper also provides practical applications of the proposed reflective model in practice.

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Reflective thinking: A re-examination

Reflection as controlled thinking

Dewey, the founder of the concept of reflective thinking in education, defines reflection as "active, persistent, and careful consideration of any beliefs or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (1933, p. 9). He explains that the origin of reflective thinking is a felt difficulty, a state of doubt or perplexity, which follows with the suggestion of some way out--the consideration of some solution for the problem. The data at hand, he says, cannot supply the solution; they can only suggest it. What then are the sources of the solution? Dewey (1933) indicates that past experience, a fund of relevant information, whether or not the thinker has some acquaintance with similar situations and materials at hand may help him/her to find some way out. However, unless there has been some analogous experience, confusion remains which urges the thinker to think and weigh the grounds on which the solution rests. Dewey further distinguishes between ordinary thinking and reflective thinking by emphasizing that the latter includes a "conscious and voluntary effort to establish belief upon a firm basis of evidence and rationality" (Dewey, 1933, p. 16).

Similarly, in an analysis of reflective thought process, Hullfish and Smith (1961) define reflection as controlled thinking which is guided by purpose and tends to be recursive. Basing their views on epistemological analysis that defines knowing as the interelatedness of memory, imagination and sentiency, Hullfish and Smith argue that "the raw data of experience (pure sentiency) are not objects of knowing" (p. 34). Rather that the interpretation of the raw data which is the result of the overtone of memory (past experiences) and imagination is. In their view, when the cues are meaningful (that is, the more related to the past experience) and recognition takes place quickly (instantaneous function of thinking which they call "a synthetic function"), there is no need to exercise conscious control of the thought process. But when recognition fails, even momentarily, the situation calls forth feelings of uncertainty and doubt which requires the individual to become aware of both "the analytic and synthetic functions of thinking" (p. 74). Thus, as with Dewey (1933), Hullfish and Smith call this feeling of uncertainty and doubt "the ground from which reflective thinking arises and a ground which intermingles emotional involvement and reflective thinking" (1961, p.36).

Reflection and tacit knowledge

In a more recent conceptualization of reflective thinking, Schön (1987) expands on Dewey's definition of reflective thinking by emphasizing the tacit or intuitive nature of knowledge and the ways of revealing it through self-reflection. Schön (1987) speaks of intuitive knowledge with a special focus on the knowledge that is tacit (knowledge in action). As compared to decision making models or even Dewey's notion of reflection, this type of knowledge/action activity does not rely on a series of conscious steps in a decision-making process. This knowledge is inherent, instead, in action; it is based, in part, on the past experience of the practitioner interacting with the particular situation. Schön suggests that knowledge in action is dynamic and unconsciously controls how we act in relation to problem situations. Schön (1987), also confirms that reflection occurs when there is a surprise, when something interrupts the flow of knowledge-in-action that guides our everyday activity.

However, Schön broadens the possibilities of reflection by suggesting that we deal with the surprise or feeling of uncertainty in two ways: "reflection-in-action" and "reflection-on-action" (Schön, 1987, P. 35). Reflection-in-action occurs while the thinker is engaged in an activity and is confronted with a surprise. In such case, the person frames and reframes the problem, comprehends its context, critically evaluates the underlying assumptions that led to the problem and constructs an alternative method of solving it which can be tested on the spot (Schön, 1987). Schön further distinguishes two forms of reflection-in-action. In the more formulatic form, the thinker uses the existing rules and procedures of practice to solve the problematic situation, and in the more elusive form, the thinker responds to the surprising findings by inventing new rules on the spot. Reflection-on-action, on the other hand, is retrospective and takes place after a decisive action. The major difference between reflection-in-action and reflection-on-action, from Schön's perspective, is that the latter does not have an effect on present action and the solution remains hypothetical until it is implemented.

Reflection and epistemic assumption

Recognizing that real world problems are complex and ill-structured, King and Kitchner (1993) elaborate on Dewey's and Schön's notion of reflective thinking by suggesting that situations may be problematic for a variety of reasons, such as the unavailability of, or the impossibility of, attaining data necessary for solving the problem. Individuals who do not recognize that such situations are truly problematic cannot make reflective judgments (King

& Kitchner, 1993). Emphasizing epistemic assumptions required for reflective thinking, King and Kitchner distinguish between reflective judgment and critical thinking, two terms that are sometimes used interchangeably, even by Dewey (1933, 1938).

King and Kitchner argue that critical thinking focuses on inductive and deductive logic skills, and assumes that learning logic or general problem solving principles and knowing how to use them will lead to critical thinking. By contrast, King and Kitchner explain, "rather than logic, basic differences in assumptions about what can be known and how knowing occurs differentiate authority-based thinkers from those who use reflective thinking" (King and Kitchner, 1993, p. 9). From their perspective, deductive and inductive logic cannot totally account for a naturally occurring, rational problem solving because a person may argue validity using formal logic, but still use authority as the basic criterion for truth. They further argue that problems that can be solved using deductive and inductive logic can also be described with a high degree of completeness, certainty and correctness (well-defined). Such problems do not require considering alternative arguments, seeking out new evidence, or evaluating the reliability of data and sources of information (Kitchner, 1983). However, real world problems that require reflective thinking are far from well-structured (Churchman, 1971). The solution to the ill-structured problems depends on how well the thinker is able to evaluate the logical strength of one frame of reference against another.

Reflection and abduction

Along the same line, Hullfish and Smith point to the power of abductive reasoning for solving ill-structured problems. They argue that while most of us are familiar with deductive and inductive reasoning, unfortunately, we tend to view these inferences as separate types of thinking instead of viewing them as movements arising within the total reflective process. They explain the differences between abductive inference and two other forms of inferences as follows.

> . . . In the situation calling for deduction we are confronted with two propositions believed to be related by implication. Our reason for reasoning is to infer the truth or falsity of one from the truth or falsity of the other. In the situation calling for induction we are confronted with materials which are believed to be a fair sample of a large class of familiar material. Our reason for reasoning in this instance is, to infer what is safely assertable about the whole class from what may be discovered about the sample. But in the case of abduction, we are confronted with facts, events, situations, and the like believed to be relevant to some interest, question, or problem. Our reason for reasoning now is to create, by inference, possible explanations for these facts (p. 120).

Hullfish and Smith conclude that hypothesis formation during reflective thinking process or abductive inferences is our initial hunch or idea, which constitutes our hypothetical solution for the problem raised. Using abductive inference, we attempt to order what is observed. In our attempt, we do not assume the existence of anything whose operation could not be observed and verified. It is thus that hypotheses are created, and these hypotheses direct the investigation that leads to the desired ordering. Within the investigation, Hullfish and Smith attest, both inductive and deductive inferences may function (Hullfish & Smith, 1961).

Furthermore, in the case of abduction, there is almost no guarantee for certainty, and so the principles of sound abduction in fact, are the principles of sound guessing (Shank, 1987). The guess or hypothesis that we select as the best is not necessarily the very best possible hypothesis on the subject, but simply the best that we have based on the available data. In other words, when confronted with an ill-structured problem, we find that many hunches or suggestions or hypotheses presents themselves, and we must select among them. In choosing among the hunches that present themselves, we progressively eliminate or modify any suggestion that does not account for the facts which would have to be regarded as relevant if the hunch is to be accepted as a working base. This type of thinking and reasoning calls attention to the fact that our knowledge of factual affairs is subject to possible revisions or rejection in the light of new evidence (all factual assertions are subject to modification as new evidence develops). It also indicates that our theoretical accounts are never finally verified and are subject to revisions or rejection when someone creates another way of structuring experience that proves to be even more useful. This form of thinking and inferencing may also be contrasted with the form in which one accepts a belief uncritically by relying upon authority without recognizing the modifications which new facts must introduce (Columbia Associates in Philosophy, 1923; King & Kitchner, 1993).

Reflection: A willingness to act

Reflective thinking is an emotional as well as rational process (Dewey, 1933; Hullfish & Smith, 1961, 1966; King & Kitchner, 1993). Both Dewey and Hullfish and Smith argue that emotions are central to reflective thinking. The individual becomes involved in only those problems he accepts to solve. Inevitably, therefore, "his biases, knowledge and values are vital factors in the reflection he carries on in problem situations" (Hullfish & Smith, 1961, p.109). Although reasoning gives the individual the ability to rise above any pattern of belief which is formed as a result of an unthinking or conditioning process (prejudice), the removal of prejudice is no simple matter. Prejudices are rooted in such deep feelings that it does not occur to us to question them. Due to our deep emotional attachment to a belief, we may avoid reflective construction of our experience by engaging in the act of rationalization. Sometimes rationalization takes the form of gathering considerable evidence to prove congruency for parts of the beliefs that were not incongruent in the first place. Therefore, reflection requires the thinker to be inclined to be thoughtful or reflective about the problem.

Reflection as a social practice

In a most recent analysis of reflective thinking, Zeichner and Liston (1996) criticize the way Dewey, Schön and others conceptualized reflective thinking. They argue that reflective thinking has been portrayed as a highly individualistic affair involving the thinker and the situation, and not a social process taking place within a learning community. Zeichner and Liston and several other scholars (Osterman & Kottkamp, 1993; Solomon, 1987), therefore, introduce the idea of reflection as a social practice and make the argument that our ideas/hypotheses become more real when we can speak about them to others. They further argue that the thinker should also be encouraged to reflect on the social context within which the problem situation exists. Recognizing the social context, they suggest, will lead the thinker to see how his problem situation is linked to other problems that exist in the institutional and social context.

In sum, it seems that what sets reflective thinking apart from other forms of problem solving and critical thinking is an individual's ability to not only reason abductively (Hullfish & Smith, 1961), but to willingly examine one's own beliefs or assumptions about the source of knowledge and the meaning of "truth" when faced with ill-structured problems (King & Kitchner, 1993). Furthermore, reflective thinking is an individual and/or social attempt to reorganize or reconstruct self as well as past experiences. It is the process by which the individual (sometimes in dialogue with others) comes to new understandings of his self, his actions, and his taken-for -granted assumptions.

A Reflective Thinking Model

Figure 1 presents a spiral model that summarizes the process and components of reflective thinking discussed in the previous section. The model assumes that reflective thinking is an insequential but purposeful mental activity. As shown in the model, according to Dewey, Schön and others, there are five phases of reflective thoughts (Columbia Associates in Philosophy, 1923; Dewey, 1933; Hullfish & Smith, 1961, 1966; Glaser, 1972; Schön, 1987): (1) Problem recognition or problem setting, (2) problem clarification or what Dewey called "intellectualization" of the problem, (3) hypotheses or suggestion formation and modification, (4) mental elaboration of suggestions, and (5) action taken on the basis of the best supported hypothesis or suggestion.

While these phases describe mechanics of the reflective process, six components explain the nature and dynamics of reflective thinking process: (1) Willingness to be thoughtful, (2) willingness to recognize and understand the context within which assumptions and the actions are formed, (3) willingness to explore and imagine alternatives, (4) the understanding and accepting of real uncertainty (epistemic assumptions), (5) using abductive inference, and (6) being exposed to a variety of interpretive considerations (in dialogue with others). The phases and components of reflective thinking are interdependent. In other words, the ability to engage in the reflective thinking process depends on whether or not the components of reflective thinking exist.

As Figure 1 shows, reflection happens only if the designer is inclined to be about his/her beliefs. While thinking is natural, reflective thinking is not. A designer must be willing to consider his beliefs and engage in reflective thinking (Dewey, 1933; Grimmett, MacKinnon, Erickson, & Riecken, 1990; Hullfish & Smith, 1961; King & Kitchner, 1993). Without the disposition to engage in reflective thinking, designers will not be able to see issues from their client's view point. Furthermore, true reflective thinking presupposes that the designer holds the epistemic assumptions that allow him/her to understand and accept the real uncertainty and differentiate between well- and ill-structured problems of practice (King & Kitchner, 1993).

Willingness to recognize and understand the context within which designer's assumptions and the actions are formed is a major component of reflection (Brookfield, 1987; Zeichner & Liston, 1996). Contextual designers view their dearly held beliefs and values as, to some extent, social. They understand that value systems and behavioral codes are socially transmitted as well as personally generated by personal experiences. They are willing to acknowledge that their decisions and actions have an effect on their social context. The designer's willingness to realize that his/her personally devised values, beliefs, and moral codes are, in fact, culturally induced, results in forming hypotheses or suggestions that are context specific and broader in perspective.

Central to reflective thinking is the designer's capacity to explore and imagine alternatives to solve a problem situation (forming hypotheses and mental elaboration of hypotheses). When the designer realizes that there are alternative hunches (guesses, hypotheses) to a problem situation, he/she is skeptical of the claim to universal truth or to ultimate explanation. Such a designer scrutinizes and clarifies the problem by attending to the facts, events and situations that he/she believes to be relevant to the problem (abductive inference) instead of jumping to an inductive generalization. Of course, the question of which facts are truly relevant, is a matter of inquiry. When confronted with a performance problem, a reflective designer has many hunches or hypotheses. He/She then chooses among the hunches that present themselves by eliminating or modifying any suggestion that does not account for the facts which would have to be regarded as relevant if the hunch is to be accepted as a working base (Hullfish & Smith, 1961). However, the reflective designer realizes that the chosen hypothesis is still hypothetical and subject to continual modification in the process, or even to replacement. This form of thinking which Shank (1987) calls "acts of skill" instead of reasoning, (p. 279), can be the source of the designer's creativity (Peirce, 1955) because it helps him/her to move back and forth from facts to theory and theory to facts.

On the basis of the best supported hypothesis or hunch, a reflective designer must take an action and seek confirming evidence, which can leave him/her to make the judgment or come to a resolution for the problem. As Schön defines in his reflection-in and on-action, the designer should have the opportunity to experiment with the actual operation of his/her solution before determining practice (reflection-in-action). However, there are times that the designer cannot experiment with the actual operation of his/her conclusion (reflection-on-action). In such cases, the closing of reflective process incident comes only after the experimental verification (Schön, 1987).

Three aspects of reflection: From theory to practice

Emphasizing the importance of reflection as a key element of designers' creativity and professional growth, the preceding model was used to identify three aspects that are essential in fostering reflective thinking in instructional designers. These three aspects are:

- Self-reconstruction (understanding of assumptions underlying thought and action)
- Action-reconstruction (new understanding of the problem situation)
- Social-reconstruction (reexamining taken-for-granted assumptions about design and development)

For each of these aspects, it is assumed that the source of knowledge for reflection is both found in the context of action and in the practical application of personal knowledge. It is also assumed that puzzlement and subsequent reflection about a situation or presuppositions that guide action in it, lead to a mode of knowing described by Grimmett and others (1990) as "dialectical" (p. 27). In this view, knowledge is seen as emergent, that is the designer reframes and reconstructs past understanding in such a way as to generate a fresh appreciation of a practice situation (Schön, 1987). Each of the three aspects are subsumed under these assumptions.

Self-reconstruction

This aspect of reflection is focused on the individual's view of himself/herself as a designer (what it means to be an instructional designer). In this aspect, future designers perform a personal search to become more aware of the cultural milieu in which they operate. Van Manen (1987) describes three ways in which the idea of self-reflection can be used: self-reflection as an ontological phenomenon, self-reflection as a life philosophy, and self-reflection as a methodological concept. As an ontological phenomenon, self-reflection is concerned with ways of being in the world (Grimmett et.al, 1990) and with how we come to understand our own existence. Self-reflection as a life philosophy focuses on individuals' understanding of themselves through life and life experiences. Finally, self-reflection as a methodological concept refers to being attentive and thoughtful to the relationship between theory and practice. Self-reflection from this perspective means being able to develop and provide warrants for our own beliefs and interpretations. Generally speaking, the three levels of self-reflection provide designers with an

opportunity to shape and restructure their tacit knowledge and beliefs about design and development which will directly impact the way they think and the way they make judgments and decisions.

Action-reconstruction

In action reconstruction, designers reframe actual problem situations in a manner which leads to new insights about design theories. The process of reframing the experience will lead to a new way of seeing the situation (learning to think abductively). Based on this aspect of reflection, designers learn to examine the existing problems of design practice abductively and conceptualize needed changes based on reflection-in and on-action. In this aspect of reflection, designers learn to understand and examine a variety of contexts ranging from face-to-face interaction with expert designers, developers and clients to social and political forces influencing what goes on in settings. In order to understand and deal with situations, designers identify the cultural context of the problem and engage in generating alternative perspectives.

Social-reconstruction

Social-reconstruction refers to the aspect of reflection that requires designers to identify and address the social, political, and cultural conditions that frustrate and constrain empowerment and self-control. This aspect of reflection discovers those beliefs or behaviors which preserve the inadequacies of the current system and prevents the introduction of new ideas and better approaches in instruction. By involving designers in critical reflection, designers will make explicit for themselves the intentions and underlying assumptions, knowledge, values, and sensitivities that guide the design practice.

Promoting reflective thinking in instructional designers: Strategies and suggestions

Each of the three aspects of the reflective thinking approach suggests conditions and strategies that can promote different components of the reflective thinking process. The reflective thinking approach differs from the traditional learning theory approach in developing expertise in designers. While in traditional learning theory approach, specific techniques of analysis and learned rules of practice are emphasized, the proposed reflective thinking approach is grounded in the designers' own internal rules for making sense of the experiences. Furthermore, the reflective thinking approach to developing expertise includes designers' personal understandings of practice situations. This form of knowledge construction requires an engagement in authentic cognitive activities in which the novice designer is challenged by a mentor through constant dialogue and sharing of the experiences. This kind of environment not only resembles the every day social setting in workplaces, but it also helps designers become reflective in the analysis of their own actions through the cycle of reflection consisting of problem setting, reframing (clarifying the problem) and resolution. This form of knowledge construction also requires a learning environment in which novice designers are constantly encouraged to question the validity of their presuppositions and the relationships between these assumptions and the social, political and cultural conditions. Thus, a cognitive apprenticeship model (Collin, Brown, Newman, 1989) accompanied by assistance or "scaffolding" from mentors, creates the best conditions for reflective thinking. The following section looks at a number of strategies that can be used to promote reflective thinking in instructional designers. It must be noted that the role of mentor or expert designer is critical in promoting all aspects of reflective thinking.

Strategies to facilitate self-reconstruction

Self-reconstruction can be best facilitated within an apprenticeship model in which the mentor helps the novice designer to reflect on his/her underlying assumptions upon building trust and self-respect. The mentor may assign mysterious tasks, introduce contradictory ideas, question tacit assumptions, or refuse to answer questions in order to create disequilibrium. The mentor can also create the conditions in which designers ask critical questions about why people think and behave in the ways they do, how people come to know something (epistemology of knowledge) and what the relationship is between what they think and what they do. Another condition that can promote self-reconstruction is called critical incident, a technique that was first introduced by Flanagan more than forty years ago (1954). The focus of the critical incident is on the events that are of particular importance to the thinker. Critical incidents provide expert mentors with hunches as to what are the most significant concerns and assumptions of the novice designers. They are also important because they encourage designers to talk about themselves without being consciously aware of it. For example when a designer criticizes other designers' actions as inappropriate, he/she is saying something about his/her own conception of practice. Identifying and analyzing the validity of assumptions influencing design practice and critical debates are also conditions that can promote self-

reconstruction. While critical analysis helps designers develop criteria for evaluating their beliefs and assumption, critical debates will assist designers to take an unfamiliar perspective on an issue or to explain in a sympathetic manner a position with which they disagree.

Strategies to develop action-reconstruction

Although the spiral model of reflective thinking may suggest an overemphasis on the procedures of logical thinking, the whole reflective process is far messier than four or five stages. For example, the designer may move back and forth between problem situation and analysis of alternatives many times before reaching a tentative conclusion or solution. Moreover, anywhere during the process the designer may have an insight that suggests a reconfiguration of all parts of his/her previous deliberation; after much consideration, no alternative may appear warranted, yet the designer needs to choose an action; or new circumstances may develop causing the designer to temporarily stop the process. Thus, reflective thinking requires both rational and intuitive thought process. Promoting such thinking requires authentic activities in which designers face the real world problems of practice. Simulated cases in which novice designers work in groups to simulate real world problems and the process of solving them will facilitate their abductive reasoning skills. Reflective discussion must follow the simulation cases to provide designers with formative feedback and to encourage them to engage in self-assessment. Varying both the degree of complexity and the uncertainty of the simulated cases will allow for a gradual development of reflective thinking. Another strategy that can provide the proper conditions to promote reflective thinking is participate in a real design activity. Engaging in real tasks of analysis, design and development and working directly with clients provides the best opportunity for novice designers to test their theories in action. Such activities will not only help designers to tests theories, but also to realize the dissonance between what they say they believe in and what they suspect to be true. During these activities, designers should be encouraged to use ethnographic or interpretive techniques and to reflect on the reasons why specific theories are not working and to seek alternative forms of practice. This reflection-in-action must be followed by reflection-on-action in which designers engage in identifying assumptions underlying specific theories and considering the fit between these assumptions and the reality of professional practices. One process that must be emphasized in real world problem solving activities is that of the problem setting (Schön, 1983). Designers must realize that in real world practice, problems are defined by their participants rather than external authorities. The problem setting, therefore, is grounded in designers' contextual awareness of the important aspects of the workplace life.

Strategies to develop social-reconstruction

The uncovering of assumptions underlying organizational cultures, and the discovery of the connections between policy decisions, legislative change, and designer's decisions are probably the most untouched areas of reflection. Designers must have the opportunity to discover the issues of control and power and how they are affecting people's personal relationships. Questioning the basis on which individuals, groups and systems exercise power and making connections between isolated incidents and broader political happenings is the heart of the reflective thinking approach. Without this realization, design efforts will become re-active instead of pro-active. Activities such as asking novice designers to speculate imaginatively on alternative ways of distributing power, or how hierarchies might be dismantled and structures changed in an organization could facilitate understanding of the social and political connections with individual design efforts. Conducting an analysis of the culture of organizations which is based on actual data, analysis of personal biographies in light of how individuals have assimilated dominant cultural values, providing experiences of practicing the democratic process of decision making and asking questions about why power and wealth are distributed the way they are, are some of the useful strategies.

Conclusion

In this paper, I have attempted to reexamine the concept of reflection and reflective thinking as a means of developing expertise in instructional designers. I have argued that since the real world problems that designers face are ill-structured and ill-defined, designers must become reflective thinkers in order to define the problem, evaluate and examine relevant information and construct a plausible solution, acknowledging that the solution itself is open to further evaluation and scrutiny. In an attempt to describe conditions and strategies for promoting such thinking processes, I proposed a conceptual model which led me to identify three aspects of the reflective thinking approach and suggest a number of strategies for promoting each aspect. The reflective thinking approach proposed opens a new way of educating and training instructional designers which is consistent with new conceptualization of the

instructional design models and with the constructivist learning theory. Although much more must be learned and discussed in this area, reflective thinking approach has obvious implications for the instructional design field.

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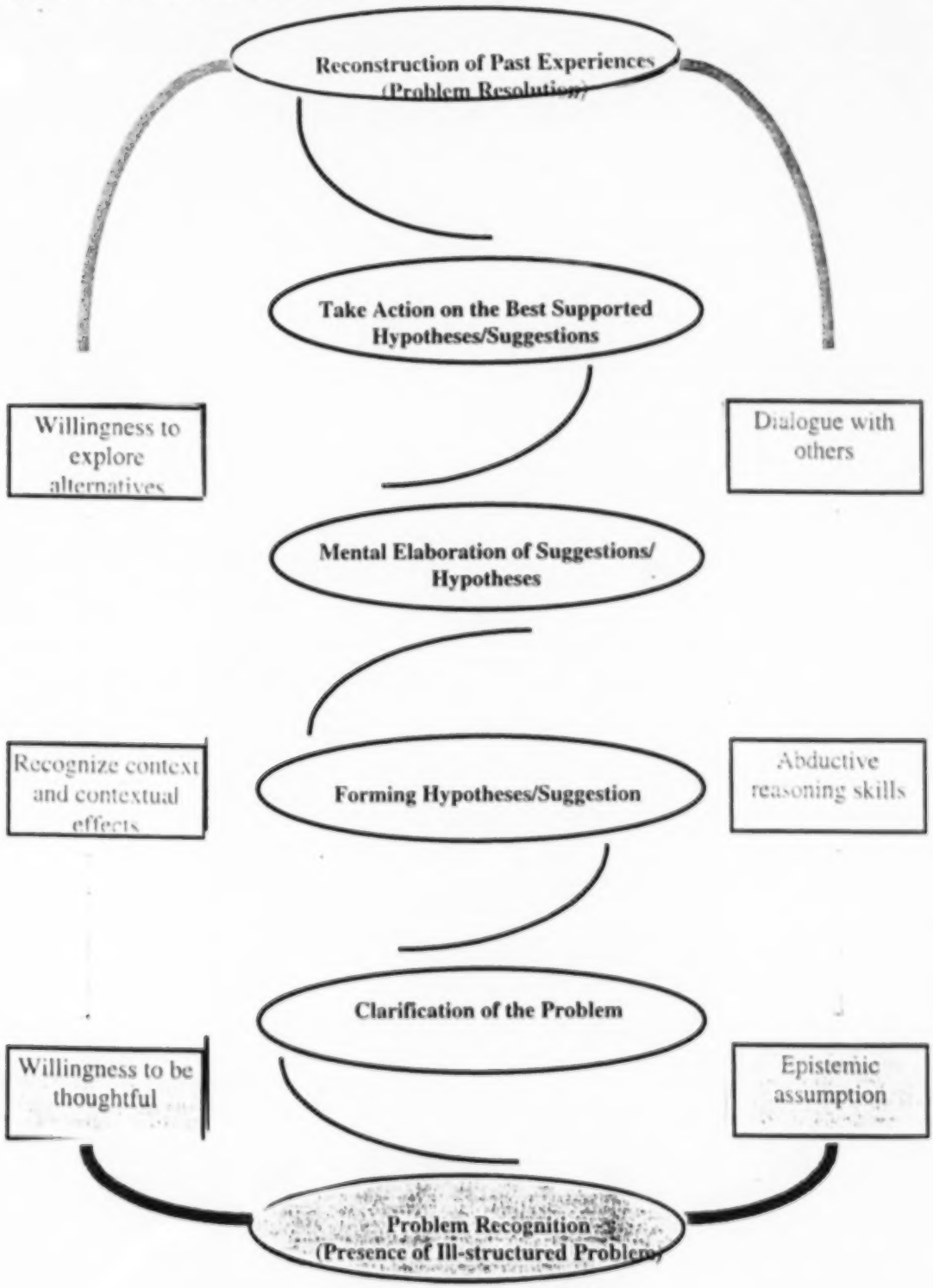
Figure 1: A Model of Reflective Thinking



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